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NEW OR UNUSUAL MEXICAN AMPHIBIANS

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An examination of several small Mexican herpetological collections, received at various times during the past five years by the American Museum of Natural History from Mr. Thomas C. MacDougall, disclosed the presence of certain rare species and certain presumed new species of salamanders and frogs. With his characteristic generosity Mr. Charles M. Bogert, Chairman and Curator of the Department of Amphibians and Reptiles, has forwarded these to me with the request that I study the lot and describe the new forms.

The source of most of these collections is the little-known mountainous areas of southern Oaxaca; however, one species here described, *Thorius minutissimus*, is from Cerro Humo, which lies in the northern part of the state. The mountains of southern Oaxaca are divided into two unequal masses by the intervention of the low land of the Isthmus of Tehuantepec with elevations of less than 2000 feet. The area lying in the southeastern part of the state, with reported elevations of 7900 feet, marks the beginning of the coastal ranges of the Pacific side of Chiapas and Central America. That in southern and western Oaxaca is very much the larger and higher, an elevation of 10,299 feet having been reported. This mass is similarly isolated by relatively low land from the high ranges of Guerrero lying to the west and largely surrounded by the Balsas basin, and in which elevations above 12,000 feet occur. Maximum elevation of the connecting land between the two masses is between 2000 and 3000 feet.

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Because of the isolation of these various mountain masses it is not surprising that some novelties have been encountered. It is strongly probable that explorations at still higher elevations will yield even a greater number of unknown species.

The few collectors who have penetrated these areas of southern Oaxaca and southeastern Oaxaca have discovered several important amphibian species, among which may be mentioned *Diaglena reticulata* Taylor, captured by MacDougall previously, and *Magnadigita macrinii* (Lafrentz), collected by the describer, Dr. K. Lafrentz. It is also quite probable that it was in these areas that such Mexican species of unknown specific locality as *Hyla plicata* Brocchi, *Cauphias crassum* Brocchi, and *Spelerpes sulcatum* Brocchi were collected—species that have eluded collectors during the 75 years since their original discovery.

In this paper I am describing as new two diminutive species of the salamander genus *Thorius* and two frogs, one in the genus *Ptychohyla* and one in the genus *Plectrohyla*. Comments are made on the following known species: *Pseudoeurycea cochranae* (Taylor), *Magnadigita macrinii* (Lafrentz), *Hyla loquax* Gaige and Stuart, and *Centrolenella viridissima* Taylor.

I wish to acknowledge my indebtedness to Mr. Charles M. Bogert and Mrs. Bessie Matalas Hecht for the privilege of studying these specimens. I am obligated to Dr. Norman Hartweg and Dr. Charles F. Walker for the loan of certain species of *Plectrohyla* with which I have compared the species herein described. All of the recognized species of this genus have been examined in this study.

***Pseudoeurycea cochranae* (Taylor)**

Bolitoglossa cochranae TAYLOR, 1943, Univ. Kansas Sci. Bull., vol. 29, pp. 343–345 (type locality, Cerro San Felipe, Oaxaca, Mexico).

Pseudoeurycea cochranae, TAYLOR, 1944, Univ. Kansas Sci. Bull., vol. 30, p. 209.

A single specimen, A.M.N.H. No. 51821, is referred to this species. It was collected along with three specimens of *Magnadigita macrinii* (Lafrentz) at Quiegolani, Oaxaca, by Thomas C. MacDougall, in 1944. This is the first collection of the species at a place other than the type locality, and it extends the known range approximately 75 miles to the south.

The specimen has been compared directly with the type, and, while certain apparent differences were noted, it is believed that all of them are traceable to the character of the preservation and are

not actual. The specimen is much darkened, but when submerged in water the light markings can be seen. The tail is missing. However, all the characters that are diagnostic of the species can be discerned save those involving the tail.

***Magnadigita macrinii* (Lafrentz)**

Oedipus macrinii LAFRENTZ, 1930, Abhandl. Ber. Mus. für Naturk. u. Heimatk. Naturwiss. Ver. Magdeburg, vol. 6, no. 2, pp. 150-152 (type locality, "Cerro Espino, 1000 m hoch, subtropischer Laubwald am Südhang der Sierra Madre del Sur, bei Concordia, Staat Oaxaca, Mexiko").

Bolitoglossa macrinii, TAYLOR, 1941, Herpetologica, vol. 2, p. 65.

Magnadigita macrinii, TAYLOR, 1944, Univ. Kansas Sci. Bull., vol. 30, p. 218.

Since the discovery of this species by K. Lafrentz in Oaxaca in 1927, no specimens, so far as I know, have reached collections save the three here recorded (A.M.N.H. Nos. 51822-51824). These were collected at Quiérolani, Oaxaca, by Thomas C. MacDougall in 1944. Since the original description omits numerous characters I am presenting data on these specimens.

To the following table of measurements I append for comparison such measurements of the type and two paratypes as have been published.

TABLE 1

MEASUREMENTS, IN MILLIMETERS, OF *Magnadigita macrinii* (LAFRENTZ)

A.M.N.H. Numbers	Sex	Snout to Vent	Tail	Snout to Arm	Axilla to Groin	Arm	Leg	Head Width	Head to Gular Fold
51822	♀	52	(38) ^a	17.2	29.0	12.2	13.2	9.0	13.0
51823	♂	69	70	22.5	37.0	16.7	18.0	10.9	16.2
51824	♀	73	(42) ^a	22.0	38.5	17.0	18.0	12.0	15.2
Type	♂	50	47	—	—	—	—	8.5	12.0
Paratype	♀	64	58	—	—	—	—	11.5	12.5
Paratype	♂	69	72.5	—	—	—	—	—	15.0

^a Regenerated.

The maxillary teeth of this species are small and have a tendency to grow upward towards the palate rather than down in the normal manner. The vomerine teeth are somewhat irregular. In the two females there is a tendency for the teeth to be arranged in two rows in each group, while in the large male the teeth are fewer and are arranged in a single curving row. The series begin beyond the outer level of the choanae and curve in and back. Mesially they

are separated by a space equivalent to twice that between two teeth in one; four times, in the other two. The vomerine teeth are separated from the paravomerine teeth by a variable distance—in one specimen the space is equal to that between the vomerine series; in another, four times the distance between them. In all cases the paravomerine teeth form a large single group, greatly widened posteriorly and somewhat notched behind.

TABLE 2

DENTAL CHARACTERS OF *Magnadigila macrinii* (LAFRENTZ)

A.M.N.H. Numbers	Sex	Maxillary Teeth	Mandibular Teeth	Vomerine Teeth	Paravomerine Teeth	Premaxillary Teeth
51822	♀	16-17	34-32	18-17	In single group	4-4
51823	♂	17-18	41-40	15-14	In single group	9
51824	♀	28-30	32-34	20-19	In single group	10

There is no trace of a sublingual fold. The choanae are moderately large, separated from each other by a space equal to 5.5 times the diameter of one. The diameter of the eye is about .5 mm. less than the length of the snout. Twelve costal grooves are present (or 13 if one counts a groove in the groin).

Another striking character of this form is the absence of the mental gland in the male. The constriction of the tail is more marked than in other species of the genus, since the base of the tail suddenly widens behind the constriction. Lafrentz (*loc. cit.*) mentions one of the paratypes as having a tail as wide as the body, at its base. When the limbs are adpressed they are separated by two costal folds. The cartilages on the side of the neck form lateral elevations that extend above and behind the arm insertion to the second costal groove. The costal grooves can be traced across the belly, and dorsally almost to the middorsal line. The skin on the costal folds is usually longitudinally wrinkled. The cloacal region of the male is distinctly papillate over the greater part of the lateral walls; in the female the lateral folds are confined to the anterior part of the cloaca only.

The types are described as showing silvery flecks on the sides of body and tail. The American Museum specimens, probably long preserved in formalin, show no such markings but are shiny black above, becoming a little lighter on the ventral surfaces, the smallest specimen being somewhat the lightest. Silvery marks such as those described in the type are present on the venter and sides of certain

Pseudoeurycea cephalica manni (Taylor), a black form from more northern parts of Mexico. These silvery marks often completely disappear from preserved specimens of the species. Hence, I am presuming that these specimens of *macrinii* may likewise have had the expected typical markings when alive.

In various forms of salamanders the premaxillary teeth of the adult male penetrate the upper lip and are visible when the mouth is closed. In this form, however, the premaxillary teeth remain in the same normal position in the jaw as occurs in females of the species.

***Thorius minutissimus*, new species**

HOLOTYPE: A.M.N.H. No. 52673, adult female, collected at Santo Tomás Tecpan, Oaxaca, Mexico, March 3, 1946, by Thomas C. MacDougall.

PARATYPES: A.M.N.H. Nos. 52674, 53930–53932, collected with the type by the same collector; University of Illinois Museum, Nos. 3754–3759, same locality and collector.

DEFINITION: A diminutive species, the greatest snout-to-vent length, 22 mm.; greatest total length, 47.5 mm.; head width (3.3 mm.) in snout-to-vent length, 6.6 times. Snout rather bluntly narrowed; fifth toe greatly reduced or absent; adpressed limbs separated by 6.3 folds. Eyelid black, contrasting strongly with brown dorsal coloration of head.

DESCRIPTION OF THE TYPE: The width of head contained in snout-to-vent length 6.6 times; head length to gular fold (measured at median ventral point) contained in this distance 4.9 times; width of the eyelids slightly less than distance between orbits; length of eye about a fourth longer than snout; nostril large, oval, diagonally placed, its greatest diameter greater than its distance from lip edge, and greater than its distance from eye; distance between nostrils about 1.7 times diameter of a nostril; orbitolabial groove runs below eye and bisects lip on a level with back edge of eye.

A deep groove begins at upper level of eye, runs down and across jaw angle and throat to opposite side; an obsolescent arched groove rests on this groove as a base, extending forward; a strong gular fold across throat, curving forward; from ends of this fold nuchal folds arise and pass up on sides of neck to level of upper part of eye but fail to reach dorsal median line; a short groove from eye runs diagonally upward but does not reach first

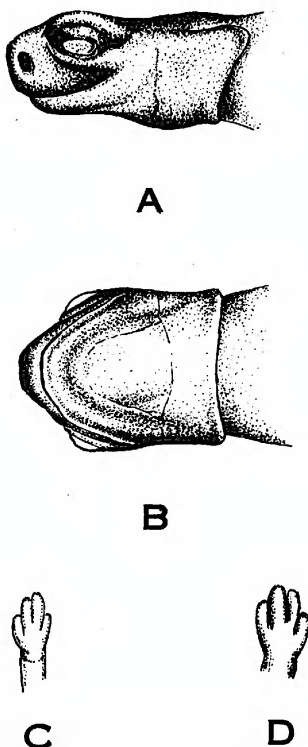


FIG. 1. *Thorius minutissimus*, new species. Type, A.M.N.H. No. 52673; adult female. Santo Tomás Tecpan, Oaxaca, Mexico. A. Lateral view of head. B. Ventral view of head. C. Hand. D. Foot. All about $\times 5.6$, somewhat diagrammatic.

transverse groove. Snout narrowed anteriorly and rather bluntly pointed. A strong sublingual fold present, slightly free anteriorly; tongue free; no maxillary teeth present; no premaxillary teeth discernible in type (present in males); about six vomerine teeth on a transverse ridge; choanae minute and of no greater diameter than diameter of grooves which run from them; teeth present on mandible; paravomerine teeth in a single large group, well separated from vomerine teeth; lateral cartilages on sides of neck form folds extending only as far as arm insertion.

Skin generally smooth but somewhat pitted on head; entire body covered with minute circular glands save on eyelids and areas about arm and leg insertion, the individual glands not only proportionally but actually larger than those in *Thorius nariso-valis* Taylor, the largest species of the genus (in any given surface measurement individual glands less numerous); 14 costal grooves,

counting one each in groin and axilla, but last costal fold very narrow, not traceable across venter; about 29 caudal grooves on tail; caudal constriction dimly indicated; tail (somewhat shrunken) definitely quadrangular in cross section; arm length equivalent to length of $3\frac{3}{4}$ costal folds, the leg to $3\frac{1}{2}$ costal folds; when adpressed along body, arm and leg separated by about $6\frac{1}{3}$ costal folds.



FIG. 2. *Thorius minutissimus*, new species. Type, A.M.N.H. No. 52673; adult female. Dorsal view of body. $\times 2.52$, somewhat diagrammatic.

Hand with two middle fingers somewhat spatulate but grown together save at tips, each outer finger completely fused with adjoining digit; apparently only four toes (some trace of fifth in certain paratypes); two middle toes large, somewhat spatulate, their tips free, somewhat rounded; outer toes on each side fused to inner.

COLOR: A broad median stripe of brown extending from snout to some distance on tail; sides a distinctly darker shade of brown; venter lighter than dorsum, with a few rosette-like light spots on chin and throat; upper eyelid blackish. Under a lens the coloration is seen to consist of rounded fawn-colored areas with a reticulation of dark brown or blackish pigment; areas about arm and leg insertion lighter; a light area on under side of legs, and a very indistinct lighter glandular spot behind leg insertion.

TABLE 3

MEASUREMENTS, IN MILLIMETERS, OF TYPE AND PARATYPES OF *Thorius minutissimus*

A.M.N.H. Numbers	Sex	Snout to Vent	Tail	Total	Width of Head	Head Length to Lateral Nuchal Fold	Axilla to Groin
52673	♀	22.0	24	46.0	3.3	4.5	12.3
52674	♀	22.0	23	45.0	3.2	4.6	12.8
53930	♀	21.5	26	47.5	3.0	4.5	11.0
53931	♀	20.5	(4) ^a	(24.5)	2.8	4.5	11.2
53932	♂	19.0	20	39.0	2.7	4.4	10.7

^a Regenerated.

VARIATION: The small outer toe, which appears to be absent in the type, is more or less evident in certain of the paratypes and seems best developed in the smallest specimen.

The single male specimen shows a larger subnarial swelling than the females do. The paratype females have premaxillary teeth. The two premaxillary teeth have barely penetrated the upper gum. The females have lamellate folds on the cloacal walls, while in the male these walls are papillate. The male has a large mental gland. That the series is adult is evidenced by the fact that the three larger females contain ovarian eggs. In one that was opened, five eggs were counted.

REMARKS: In size this species is scarcely larger than *Thorius pennatululus* Cope. Geographically, and structurally as regards the character of the nostril, it appears to be related to *Thorius narvisovalis* Taylor which occurs in the high mountains of central Oaxaca (Cerro San Luis and Cerro San Felipe) near the city of Oaxaca. The latter species is, however, much larger and has a longer tail. In it the eyelids are not darker than the rest of the head; the tail has 35 grooves. The second and fourth toes are more equally developed.

The last costal fold is partially divided (sometimes almost completely so), leaving a narrow fold between this and the groin. Thus 14 grooves may be counted. It may be more correct to ignore this and count only 13 grooves and 12 costal folds.

All the specimens are hardened so that the measurements given are only close approximations. Some of the characters have been difficult to determine accurately for the same reason.

***Thorius macdougalli*, new species**

TYPE: A.M.N.H. No. 52136, collected on Cerro de Humo, Maquiltianguis, Oaxaca, Mexico, by Thomas C. MacDougall, March 2, 1945.

PARATYPES: A.M.N.H. Nos. 53907-53929, taken with the type by the same collector.

DIAGNOSIS: Related to *Thorius pulmonaris* Taylor in having an elongate oval nostril but differs in having a relatively shorter tail (about equal to head-body length rather than $1\frac{1}{3}$ times body length); 25 caudal grooves, instead of 35 to 38, in adults. Area between eye and nostril a rounded diagonal ridge, giving the canthus a strongly notched appearance; a slight median depression on snout between the swollen areas about nostrils.

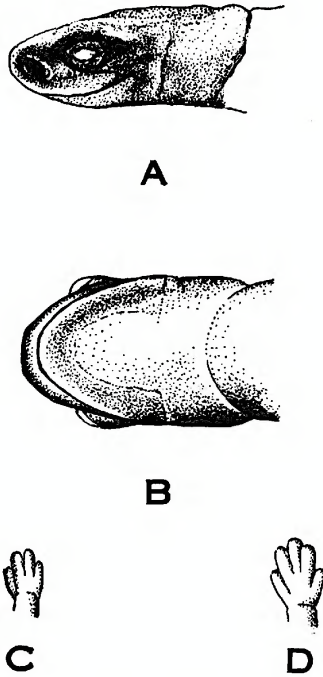


FIG. 3. *Thorius macdougalli*, new species. Type, A.M.N.H. No. 52136; adult female. Cerro de Humo, Maquiltianguis, Oaxaca, Mexico. A. Lateral view of head. B. Ventral view of head. C. Hand. D. Foot. All about $\times 6.4$, somewhat diagrammatic.

DESCRIPTION OF THE TYPE: Head bluntly pointed, the eye length equal or nearly equal to snout length; height of the snout slightly greater than its length; eyelid (.7 mm.) in interorbital width (1.1 mm.) about 1.5 times; a strong orbitolabial groove from below upper anterior corner of eye to a point somewhat behind posterior level of eye, where it bisects the lip; line of mouth somewhat angular below posterior corner of eye, and below subnarial swelling under nostril; nostril very large, elongate-oval in shape, placed diagonally, its greatest diameter about .65 mm.; greatest width of head, 2.5 mm.; distance between nostrils (.72 mm.) a little more than diameter of a nostril; small swelling below nostril not pendent; nasolabial groove runs straight down to near lip border, then turns directly posteriorly on subnarial swelling.

A strongly developed gular fold crosses neck, curving forward; from its lateral ends deep nuchal grooves pass up on sides of the

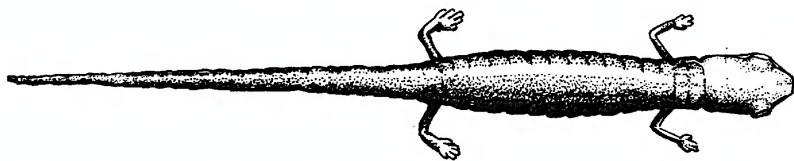


FIG. 4. *Thorius macdougalli*, new species. Type, A.M.N.H. No. 52136; adult female. Dorsal view of body. About $\times 2.4$, somewhat diagrammatic.

neck and tend to join on the dorsal nuchal line; a sinuous groove crosses throat and jaw angle and passes up on sides of head to level of eye on dorsal surface of head; a small groove runs back from posterior corner of eyes, but posterior ends of eyelids are not tucked under it; an arched groove rests on anterior chin groove, its apex directed forward; no longitudinal grooves running back from eye to the vertical nuchal groove (or if present, cannot be discerned in the type).

Vomerine teeth 2-3 on a high transverse ridge, the two series narrowly separated mesially; vomerine teeth separated from paravomerine teeth by a distance equal to entire vomerine series; no maxillary teeth present; a single median premaxillary tooth (males usually with two teeth piercing lips); paravomerine teeth in a single large patch, not, or scarcely, notched behind; a distinct sublingual fold present; choanae distinctly wider than grooves that pass out from their sides, the distance between them equal to about $2\frac{1}{2}$ times diameter of one choana.

Limbs small, when adpressed, the digits separated by $5\frac{1}{2}$ or 6 costal folds; most of outer phalanx of each of the two middle fingers free; two outer fingers not, or with but a very meager part, free from membrane; distal phalanx and occasionally part of second phalanx free on three middle toes; outer toes not free, or with only extreme tip free; middle digits are slightly spatulate, the tips more or less rounded (rather pointed in *T. pulmonaris*).

Body with 13 costal grooves, tail with 25 vertical grooves. The grooves cross venter and can be traced to near median dorsal line; a moderately distinct caudal constriction immediately following elongate cloacal opening; glandular light spot behind leg insertion distinct; skin generally smooth, but dorsal surface of head showing a finely corrugated, pitted surface; a diamond-shaped area in the occipital region more or less distinctly elevated.

COLOR: Dorsal surface very dark brown; sides blackish, gradually merging into the brown ventral coloration; subnarial

swellings grayish, and under side of chin with numerous small cream flecks that also occur sparsely, low on sides; tips of digits colored like foot and hand; under a lens individual ventral glands appear as minute rounded cream spots in a dark reticulation in which minute lighter lines are visible.

MEASUREMENTS (IN MM.): Snout to vent, 20.7; tail, 20.9; width of head, 2.5; length of head to the gular fold (median), 3.9; arm, 3.5; leg, 4.0; axilla to groin, 10.5; tip of snout to arm insertion, 11.3.

VARIATION: The major differences between the sexes are as follows: The males are somewhat smaller, their legs proportionally longer and separated by $4\frac{1}{2}$ to 5 folds only. The digits themselves are apparently slightly more slender. The mental gland is very conspicuous, the gland itself being yellow in color and occupying one-third of the distance from tip of the chin to the gular fold. The swellings below the nostrils are proportionally larger. The two premaxillary teeth in the male are especially large, piercing the upper lip and curving down. It is doubtful that any other salamander has proportionally larger premaxillary teeth. Occasionally only a single tooth is discernible, the other being apparently lost. The subnarial swelling is much larger than in the females, and slightly pendent. The nostril is apparently proportionally larger. The largest male among the paratypes measures 18 mm. from snout to vent.

REMARKS: The type is a female carrying eggs in the oviducts. A female paratype of about the same size as the type was opened and five eggs were counted. The type is carrying a plug in the cloaca which appears to be a spermatheca; similar plugs are present in certain other females. In these specimens the cloacal lips are much swollen and wrinkled. The normal cloaca of the female has the anterior part covered with folds; in the males the walls are somewhat papillate, without folds.

The chief distinction between this form and its nearest congener, *Thorius pulmonaris*, may be expressed in the following table:

<i>pulmonaris</i>	<i>macdougalli</i>
Larger, maximum snout to vent, 27.5 mm.	Smaller, maximum snout to vent, 21 mm.
Tip of digits cream colored, rather pointed	Digit tip not cream but colored like foot and definitely rounded
Tail longer, $1\frac{1}{2}$ times head-body length	Tail shorter, about equal to head-body length
Caudal grooves 35-38 in adults	Caudal grooves 23-25 in adults

Female, premaxillary teeth 4	Female, premaxillary teeth 1 or 2, small
Male, premaxillary teeth 3-4, not piercing lip, not visible externally	Male, premaxillary teeth 2, greatly elongated, piercing lip, visible externally
Mental gland indistinct	Mental gland very large, prominent

The species is named for Mr. Thomas C. MacDougall, the discoverer of this form, who has contributed much to our knowledge of the southern Oaxacan region in Mexico.

***Hyla loquax* Gaige and Stuart**

Hyla loquax GAIGE AND STUART, 1934, Occas. Papers Mus. Univ. Michigan, no. 281, pp. 1-3 (type locality, Ixpuc Aguada, north of La Libertad, El Petén, Guatemala).

? *Hyla stadelmani* SCHMIDT, 1936, Proc. Biol. Soc. Washington, vol. 49, p. 45 (type locality, Subirana Valley, 2800 feet altitude, Yoro, Honduras).

A specimen in poor condition, A.M.N.H. No. 52662, female, acquired by Thomas C. MacDougall at Río Chicapa (near El Altravesado, 1600 feet), Oaxaca, January 7, 1946, is referred to this species. The record extends the known range of the species some 300 miles to the west of Piedras Negras on the Guatemala border of Chiapas, hitherto the northernmost point known.

Some of the characters are obscured by faulty preservation, but all structural characters that can be discerned agree with those of paratypes with which the specimen was compared. The specimen has two large, deep brown, irregular blotches on the back. This is not a usual marking on northern specimens, but a specimen so marked is recorded along with the type description (*loc. cit.*).

In examining the types of *Hyla stadelmani* Schmidt, I was impressed by the strong similarity of that species to *Hyla loquax*. I suspect that a direct comparison of the types will prove beyond question that they are specifically identical. The type description of *loquax* fails to mention the presence of a considerable axillary web in the type.

Hyla loquax is not uncommon in Costa Rica. A large series of well-preserved specimens from Turrialba, Costa Rica, do not differ specifically from a paratype of *Hyla loquax* with which they were compared.

***Centrolenella viridissima* Taylor**

Centrolenella viridissima TAYLOR, 1942, Univ. Kansas Sci. Bull., vol. 28, pp. 75-77, pl. 9, figs. 2, 2a-b (type locality, Agua del Obispo, Guerrero, Mexico).

The single specimen (A.M.N.H. No. 51846) of this species in the collection is from Río Grande, Tehuantepec, Oaxaca. This is the second locality where the species is known to occur, the type locality being in southern Guerrero, Mexico. The specimen agrees with the type in the following characters: the character and position of large vocal slits; absence of vomerine teeth; the granular character of skin on most dorsal surfaces, less pronounced on middorsal region of body; traces of indistinct lighter dorsal spots (now almost completely disappeared from type); an ample anal flap and two distinct transverse postanal glandular elevations; tympanum covered with granular skin and more or less of its outline discernible; no trace of a humeral cartilage; a strongly defined dermal fold under forearm; two outer fingers nearly half webbed, but only a remnant between other digits; the first and second fingers of about equal length; and tibiotarsal articulation reaching to tip of snout.

The following differences are of no great magnitude and may be of small significance: the toes very slightly narrower and head about one-eighth wider at its widest point, although the snout-to-vent measurement is practically the same; eyes a trifle larger; eyes, seen from above, extending slightly beyond the outline of head (in the figure of the type, the head is shown slightly wider than natural, and the dark color of the eyeball showing through the upper eyelid is emphasized possibly a little too much); fingers very slightly longer. The purplish chromatophores are a trifle larger than in the type.

MEASUREMENTS (IN MM.): Total length, 23.8; length of leg, 43.0; width of head, 9.6.

Centrolenella fleischmannii, also occurring in Mexico, differs in having the second finger much shorter than the first. A white area is present on the eyelids. The leg is distinctly longer, the tibiotarsal joint reaching 2 to 3 mm. beyond the snout tip.

***Ptychohyla bogerti*, new species**

HOLOTYPE: A.M.N.H. No. 51847, collected at Río Grande, Oaxaca, Mexico, by Thomas C. MacDougall, January 21-27, 1944.

PARATYPE: A.M.N.H. No. 51848, taken with the type, same date and collector.

DEFINITION: A small hyliid (largest snout-to-vent measurement of males, 32 mm.) with a large lateral gland occupying nearly half the lateral area between axilla and groin; first finger strongly

opposable; outer fingers about one-third webbed; toes four-fifths webbed; pads on fingers equal to, or minutely larger than, tympanum; canthus rostralis sharp.

DESCRIPTION OF THE TYPE: Head slightly wider than body; eyes small, the length of eye equal to distance between eye and nostril, but not so long as snout; nostril equally distant from eye and from median notch in lip; distance between nostrils equivalent to distance between eye and nostril; diameter of tympanum contained in length of eye opening $2\frac{1}{6}$ times; the distance of tympanum from eye equal to its own diameter; width of an eyelid contained in interorbital distance about $1\frac{1}{3}$ times; canthus rostralis distinct, angular, the upper part of lores nearly vertical,

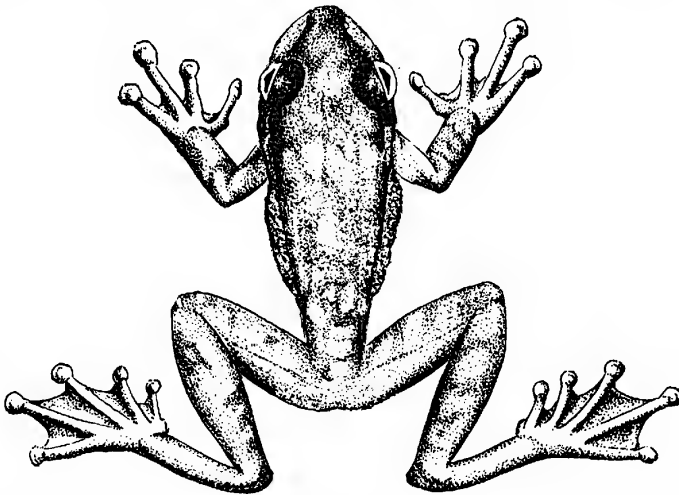


FIG. 5. *Ptychohyla bogerti*, new species. Type, A.M.N.H. No. 51847. Río Grande, Oaxaca, Mexico. Dorsal view. $\times 1.6$, somewhat diagrammatic.

the lower part sloping to lip with a slightly concave area behind nostril; the nostrils distinctly back from end of snout and the area about them slightly swollen, leaving a slight depression between them on snout; supratympanic skin fold from eye runs straight back some distance behind tympanum, then curves down towards arm insertion.

Choanae rather large, separated from each other by a distance nearly three times the greatest diameter of a choana; vomerine teeth in two small elevated fascicles directly between the much larger choanae, and separated from them and from each other by a distance about equal to the length of a single group; two teeth

on each elevation; palatal glands open into a single continuous sinuous groove, which crosses the palate in front of choanae; tongue slightly emarginate behind, about one-fourth longer than wide (in the paratype, tongue subcircular and as long as wide); vocal slits are present.

A very small axillary web evident when arms are placed at right angles to body; upper arm moderately thin; a continuous fold under forearm; finger disks about size of tympanum; first finger strongly opposed to three outer fingers; a very small group of very small nuptial asperities not, or scarcely, touching the large tubercle on base of first finger, lacking brown horny spicules; three outer fingers about one-third webbed, inner fingers about one-fourth webbed; first finger very much shorter than second; distal subarticular tubercle on fourth finger double, on third finger at least bifid. Toes about three-fourths webbed, the web reaching the distal subarticular tubercle of the fourth toe; an elevated inner metatarsal tubercle; a small indistinct outer tubercle; tarsal fold not, or only indistinctly, indicated.

Skin above generally smooth; under a lens a minute corrugation or roughness is evident; skin tends to form two lateral folds but these are impermanent; skin of sides smooth save for a large gland extending half the length from axilla to groin, and about 5 mm. wide, the glandular surface distinctly corrugated. Abdomen and much of ventral and lower posterior surface of thigh strongly granular or areolate; breast and to some extent the chin with granules much less distinct or in places absent; small tubercle or ridge on heel; the tibiotarsal articulation reaches a little beyond the tip of the snout; knee and elbow overlap when limbs are bent along side of body; a small anal flap followed by a distinct groove, the tubercles adjacent not especially differentiated.

COLOR (IN PRESERVATIVE): Above light brown or tan, clouded or spotted with darker brown without definite pattern; limbs irregularly spotted or barred; lateral gland dark brown; groin light, with a few small rounded brown spots also visible on the glands; ventral surfaces uniform light without pigment but with very numerous minute inclusions somewhat yellowish in appearance suggesting minute oil droplets; dorsal and posterior part of thigh pigmented; a broken light line present across anal flap; an indefinite light line, more or less clouded, borders edge of upper lip but no trace of a light spot below eye; under side of tarsus and foot and palm of hand with pigment.

MEASUREMENTS (IN MM.): Snout to vent, 30.0; width of head, 10.5; length of head, 11.0; arm, 18.2; leg, 48.0; tibia, 17.0; foot, 20.3.

VARIATION: The single paratype differs but little in structural characters, but the whole dorsal surface is much darker brown with blackish indefinite spots or clouding. On the ventral surface the chin and throat are flecked with brown, and there is a slight distribution of pigment on the thighs. The under side of the tarsus, hand, and foot is strongly pigmented. The spots in the groin are less discrete. As in the type the first finger is very strongly opposed to the other digits, and the head proportions are about the same.

The minute inclusions of the ventral skin are extremely numerous, but here they are whitish rather than yellowish. The large lateral gland is developed as in the type. The measurements (in mm.) are: snout to vent, 32.6; width of head, 11.4; length of head, 12.2; arm, 19.0; leg, 50.5; tibia, 17.4; foot, 21.4.

REMARKS: This species differs from *Ptychohyla adipovertris* Taylor in that the position of the large glandular area is lateral rather than lateroventral, and the nuptial asperities are distinctly smaller and not horn covered. That species has a somewhat shorter, more angular snout, the nostrils being distinctly farther forward. The tympanum is somewhat smaller, and the leg is shorter proportionally, reaching only to the anterior edge of eye rather than to the tip of the snout as is the case with *bogerti*. It is possible that the horny spicules of the nuptial asperities have been lost in these specimens if they have ever been present.¹

The species is named for Mr. Charles M. Bogert, Chairman and Curator of the Department of Amphibians and Reptiles at the American Museum.

***Plectrohyla brachycephala*, new species**

HOLOTYPE: A.M.N.H. No. 53761, collected "on a tributary of the Río Ostuta, at the foot of the Sierra Madre between Sierra Madre and Cerro Atravesado," Oaxaca, Mexico, by Thomas C. MacDougall, 1948.

PARATYPES: A.M.N.H. Nos. 53758–53760, topotypes collected with the type by the same collector.

DEFINITION: A *Plectrohyla* with short head, a simple spine on

¹ This may be a seasonal condition.

the pollex, smooth dorsal skin, concealed tympanum, a distinct inner tarsal fold but no outer; vomerine tooth groups separated widely, closer to choanae than to each other; snout very short, rounded, its elevation at nostril greater than its length; normally no double or bifid subarticular tubercles; chin and vocal sac granular; posterior edge of anal flap continuous with a lateral glandular fold curving down; a loreal black line, continued behind eye to arm.

DESCRIPTION OF THE TYPE: Length of head (12.5 mm.) distinctly less than width (15 mm.); length of snout (3.5 mm.) smaller than eye length (4.5 mm.); width of an eyelid (2.7 mm.) in interorbital distance (4.4 mm.) about 1.6 times; canthus distinct but rounded; elevation of snout at nostril (4.4 mm.) distinctly greater than snout length; nostril closer to eye than to



FIG. 6. *Plectrohyla brachycephala*, new species. Paratype, A.M.N.H. No. 53759; adult male. On tributary of Río Ostuta, at foot of Sierra Madre, between Sierra Madre and Sierra Atravesado, Oaxaca, Mexico. Spine of pollex and phalanges of first finger (greatly enlarged, and somewhat diagrammatic).

the median point of upper lip. Tympanum concealed under skin (if skin is shrivelled a little the outline of the tympanum can be seen); slight swellings about nostrils with a discernible depression between.

Vomerine teeth on two small elevated areas between the large choanae, the tooth groups nearer choanae than to each other. Choanae large, separated from each other by a space equal to $3\frac{1}{3}$ times the diameter of one; groups of vomerine teeth lie between choanae, a little more than half size of choanae, but distinctly closer to choanae than to each other; tongue subcircular, as long as wide, not, or but faintly, emarginate behind, not free;

vocal slits elongate, openings close to mandibular bone; fingers with a web remnant (one-fifth or less); disks on fingers large, that of fourth finger 2.4 mm. wide; that of first finger about half as wide; a well-developed pollical rudiment free for more than 1 mm., with the terminal part of the spine exposed; subarticular tubercles all single; a series of four or five light-tipped tubercles on under side of forearm.

Leg rather short, the tibiotarsal joint reaching eye or slightly farther; two outer toes two-thirds webbed; inner toes from one-half to one-third webbed; disks smaller than those on fingers; a strong, elevated tarsal fold extending four-fifths of tarsus; a rather large, elevated, inner metatarsal tubercle; a small indistinct outer tubercle; skin on under side of foot smooth, the supernumerary tubercles low, rather indistinct.

Skin of back generally smooth with a few indistinct tubercles chiefly over the eye, on rump, and along sides of venter; breast, under thighs, vocal sac, and to a lesser extent the chin, strongly granular or areolate. Anal flap rather small, its posterior edge continuous with a transverse skin fold; under posterior edge of the flap two swollen areas present separated by a deep groove; behind these a pair of somewhat larger tubercles, each with a white summit; a few other tubercles in this area bear white flecks.

COLOR: The type is nearly uniform dark gray with some indistinct clouding; a few indefinite darker marks on limbs and numerous minute whitish or silver flecks; a narrow black line begins on front surface of snout, runs through nostril to eye; a curving black line from eye back along the supratympanic fold to near insertion of arm; a dark area in axilla and scattered small, black brown spots along side in groin. Chin and vocal sac dark blackish; entire venter and under side of limbs strongly pigmented, but lighter than chin; under side of limbs, palm, and sole dark except for some light marks on under side of tibia.

MEASUREMENTS (IN MM.): Snout to vent, 35.0; width of head, 16.0; length of head, 13.2; femur, 18.0; tibia, 19.0; tarsus, 12.0; foot, 14.0.

VARIATION: The three paratypes agree in pertinent characters with the type. All are lighter in color, the backs displaying varying shades of brownish gray with some darker clouding. In two, the dark line on the side of head and neck is distinct; in one, very indistinct as in the type. The series of black brown spots on the sides and in the groin are very distinct in all. Two have spots on

the rump, and one has the lower part of the leg speckled black. All three have much lighter ventral surfaces. The one having the darkest chin has each granule light or whitish at its summit. One specimen has the lower edge of the dorsal coloration indefinite silvery white. The upper lip in this specimen and the loreal regions are clouded indefinitely darker and lighter. This specimen has the dorsal skin with small tubercles or pustules on back and head. Such variations as exist in body proportions may be expressed as in table 4.

TABLE 4

MEASUREMENTS, IN MILLIMETERS,^a OF THE TYPE AND PARATYPES OF
Plectrohyla brachycephala

A.M.N.H. Numbers	Snout to Vent	Head Width	Head Length	Femur	Tibia	Tarsus	Foot
53760	35.0	16.0	13.2	18.0	19.0	12.0	14.0
53761	38.5	16.0	13.5	20.0	20.5	14.5	17.0
53759	36.0	15.0	14.0	19.0	20.2	12.3	15.7
53758	40.0	16.5	15.2	18.5	19.0	12.5	16.0

^a These measurements are only close approximations, since accurate measurements have been impossible. The character of the preservation has left the specimens very brittle, and movement of the limb or digits results in their being broken. All the specimens have the head bent strongly downward, that of the type being nearly at right angles to the body.

REMARKS: Previously described are six species that may be regarded as correctly associated with *Plectrohyla*. These are *guatemalensis* Brocchi (the genotype), *sagorum* Hartweg, *matudai* Hartweg, *ixil* Stuart, *quecchi* Stuart, and *cotzicensis* Stuart. Of these, *sagorum* and *matudai* are from southern Chiapas, Mexico. The others are from Guatemala. The species here described extends the known range of the genus about 200 miles to the northwest.

Formerly I regarded *Hyla miliaria* Cope as belonging in this assemblage. However, since I have examined the type (the only known specimen), I doubt that such is the case. The pollex rudiment has different characteristics. It is not penetrated by a spine. There is a strong serrate fringe on the tarsus and forearm, and there are other perhaps significant differences. I do not know whether the quadratojugal is present or not. Until further evidence is forthcoming I shall regard *miliaria* as belonging to another hyloid group.

Another form that was originally regarded as being of the same genus as *Plectrohyla guatemalensis* is *Hyla crassa* (Brocchi). Stuart (1942, Occas. Papers Mus. Zool. Univ. Michigan, no. 455, p. 6) continues to list this form as a member of the genus. However, the absence of any trace of the pollex in the type specimen (and this a male having a vocal sac) suggests that the relationship is elsewhere among the hylids.¹ One supposes that Brocchi's data and figure are substantially correct (1882 [1883], *Étude des batraciens de l'Amérique Centrale. Mission Scientifique au Mexique*, livr. 2, p. 64, pl. 12).

The relationship of *Plectrohyla brachycephala* to the six known members of the genus may be shown by the synopsis of the genus.

KEY TO THE SPECIES OF THE GENUS *Plectrohyla*

1. Spine of pollex bifid; large species, 59 mm. snout to vent. *guatemalensis*
 Spine of pollex simple; medium species, 38–45 mm. 2
2. A distinct outer metatarsal fold; vocal slits and vocal sac absent; rostrum pointed; canthus rostralis conspicuous, marked by a low ridge; inner tarsal fold present, thick, low; maxillary teeth large, greatly reduced in number, 26–30; 45 mm. snout to vent. *colzicensis*
 No outer metatarsal fold: vocal slits and vocal sac present; inner tarsal fold present, variable in character; rostrum blunt or pointed; maxillary teeth more numerous, 40–60. 3
3. Snout rounded or bluntly pointed at tip; no vertical rostral keel. 4
 Snout sharply pointed, with or without a vertical rostral keel. 5
4. Inner tarsal fold forming a long, free, flexible fringe or flap (.5 to 1 mm. wide); tubercular flaps bordering postanal groove; height of snout a little less than length; canthus angular; vocal slits and ample vocal sac present; areas about nostrils swollen and pustular, with a depression between; dorsal surface strongly pustular; 35–40 mm. snout to vent. *matudai*
 Inner tarsal fold a low ridge not forming a free fringe; no tubercular postanal flaps; height of snout at tip a little greater than length of snout; canthus rounded, skin smooth; area about nostrils not, or but little, swollen, non-pustular, without a distinct depression between nostrils; 35–40 mm. snout to vent. *brachycephala*
5. No rostral keel present; arms very strongly thickened; skin smooth; 52–58 maxillary teeth; 39–40 mm. snout to vent. *ixil*
 A rostral keel present; arms not strongly thickened; skin may be smooth or strongly pustular or tuberculate. 6
6. Canthus rostralis not sharply marked save immediately in front of eye; skin relatively smooth with a few scattered small tubercles (rarely smooth without tubercles); inner tarsal fold may be widened distally at the

¹ Stuart (*loc. cit.*) has suggested that *Hyla robustofemora* Taylor is a specimen of *Plectrohyla crassa*, but this is definitely not the case.

inner metatarsal tubercle. Brownish gray to brown mottled with black. 35-41 mm. snout to vent.....*sagorum*
Canthus rostralis sharp edged; skin strongly pustulate or tuberculate above; arm extremely thickened, especially in males, with folds at elbow and wrist. Above, drab gray, mottled with dark brownish gray; below gray white. A compressed, free-edged, inner metatarsal fold; 40-44 mm. snout to vent.....*quecchi*

I am uncertain to what extent one may judge the character of the vocal sac development by its external appearance. This in most species varies considerably at different times of the year, depending upon calling habits and the elasticity of the skin and musculature of the throat. The presence of the vocal slits is, I feel, the best criterion of the presence of a vocal sac. The species *Plectrohyla matudai* has been reported as not having a vocal sac, yet in topotypic material I have examined, all males show that vocal slits are present, and in some specimens the sac is considerably distended externally. The species *P. cotzicensis* has been reported as lacking vocal slits and vocal sac. This is indeed the case in the single paratypic specimen I have examined (U.M.M.Z. No. 95904).

